APPENDIX A

METHODOLOGY FOR THE 1998 GENERAL AVIATION AND AIR TAXI ACTIVITY (GAATA) SURVEY

1. Overview

In 1993, the name of the General Aviation Activity (GAA) Survey was changed to the General Aviation and Air Taxi Activity (GAATA) Survey to reflect that the survey does include air taxi aircraft. Any aircraft identified as a commuter was excluded from the survey results. The number of computed aircraft types was expanded from 13 to 19 and the minimum manufacturer/model group cell was changed from 20 aircraft to 50 aircraft. Also, in 1993, two new use categories, sightseeing and external load, were added. In 1996 another new use category, public use, was added. The survey methods used for the 1998 survey are identical to those used in previous surveys, with the exception that data obtained in the 1996 and 1998 telephone survey (see section 5.2, Adjustment of the 1998 GAATA Survey Data, on page A-14), have been updated and used to make necessary adjustments to active aircraft and hours flown estimates.

1.1 Purpose of Survey

The purpose of the 1998 General Aviation and Air taxi Activity (GAATA) Survey is to provide the Federal Aviation Administration (FAA) with information on the activity of the general aviation and air taxi fleets. The information obtained from the survey enables the FAA to monitor the general aviation fleet so that it can, among other activities, anticipate and meet demand for National Airspace System (NAS) facilities and services, assess the impact of regulatory changes on the fleet, and implement measures to assure the safe operation in the airspace of all aircraft.

1.2 Background

Prior to the current survey method, the FAA used the Aircraft Registration Eligibility, Identification, and Activity Report, AC Form 8050-73, to collect data on general aviation activity. The form was sent annually to all owners of civil aircraft in the United States and served two purposes: (1) Part 1 was the mandatory aircraft registration revalidation form, and (2) Part 2 was voluntary and applied to general aviation aircraft only, asking questions on the owner-discretionary characteristics of the aircraft such as flight hours, avionics equipment, base location, and use. The FAA used this information to estimate aircraft activity.

In 1978, the FAA replaced AC Form 8050-73 with a new system: Part 1 was replaced by a triennial registration program. In January 1978, the FAA implemented a new procedure, known as triennial revalidation, for maintaining its master file. Instead of requiring all aircraft owners to revalidate and update their aircraft registration annually, FAA only required revalidation for those aircraft owners who had not contacted the FAA registry for three years. This less frequent updating of the master file affected its accuracy and representativeness:

1) the accuracy of current owners and their addresses has deteriorated;

2) the master file combined a residue of aircraft which, under the old revalidation system, would have been reregistered and purged from the file but now remain under the new system.

Part 2 was replaced by the annual General Aviation Activity Survey, FAA Form 1800-54. The 1998 version of Form 1800-54 is shown in Figure A.1. The survey is conducted annually, based on a statistically selected sample of aircraft, and it requests the same type of information as part 2 of AC Form 8050-73. The first survey took place in 1978, collecting data on the 1977 general aviation fleet. The 1998 statistics in this report were derived from the twenty-first survey, which took place in 1999. Benefits resulting from the new system of data collection include quicker processing of the results, improved data quality, and considerable savings in time and money to both the public and the Federal Government.

2. SURVEY COVERAGE

2.1 Aircraft

The 1998 General Aviation and Air Taxi Activity (GAATA) Survey covers, through a stratified probability sample, all civil aircraft registered with the FAA except those operated under Federal Aviation Regulations (FAR) Part 121 as defined in Part 119. These regulations govern operators carrying passengers and cargo for hire. They apply to scheduled operations with ten or more passengers and turbojet operations regardless of the number of passengers. They also apply to supplemental (unscheduled passenger or cargo) operations with more than 30 seats and/or a payload capacity of more than 7,500 pounds. Thus, the survey includes aircraft operating under:

Part 91: General operating and flight rules.

Part 125: Certification and operations: Airplanes having a seating capacity of 20 or more passengers or a maximum payload capacity of 6,000 pounds or more (but not for hire.)

Part 133: Rotorcraft external load operations.

Part 135: On-demand (air taxi) and commuter operations not covered by Part 121.

Part 137: Agricultural aircraft operations.

Certain aircraft meeting the above criteria have been excluded from the survey. This group includes N-numbers registered to manufacturers but not associated with a completed aircraft, aircraft in the process of being sold or with registration pending, aircraft with known invalid addresses, and aircraft for which not enough information was available to categorize them properly for sampling purposes.

Figure A.1 SURVEY QUESTIONNAIRE (Front Side)

Form Approved OMB No. 2120-0060

U.S. Department of Transportation
Federal Aviation Administration

1998 GENERAL AVIATION AND AIR TAXI ACTIVITY SURVEY
(As of December 31, 1998)

A survey for owners of airplanes, jets, rotorcraft, gliders, balloons and other aircraft

Submission of this form is voluntary. The information you provide will be used only for statistical purposes and will not be published or released in any form that would reveal specific information reported by an individually identifiable respondent.

1A. AIRCRAFT CHARACTERISTICS

If this is not your aircraft, please state so and return the survey form.

1B.
Federal Aviation Administration
800 Independence Ave., SW
APO-110 (Survey)
Washington, DC 20591
FAX No. (202) 267-9636

INSTRUCTIONS: Please answer questions for the aircraft in 1A at right.
Mail the completed questionnaire in the enclosed, postage-paid envelope to 1B:

2. Did you operate this aircraft in 1998 primarily as a commercial air carrier (FAR Part 121), or did you lease this aircraft to an air carrier?
   a......☐ YES. Do not complete the rest of this form. Please return the form to the address shown above in the enclosed postage-paid envelope.
   b......☐ NO. Please continue completing the rest of this form.
3. Did you operate this aircraft in 1998 primarily for **scheduled** regional/commuter passenger service (FAR Part 135) or did you lease this aircraft to a regional/commuter **scheduled** passenger service operator? a**......☐ YES**. b**......☐ NO**.
   Please complete the rest of this form whether you answer YES or NO.
4. In what State in the U.S. was this aircraft based as of December 31, 1998? (Please use two character State abbreviation)
5. In what year was this aircraft manufactured? ....

6. Is a global positioning system (GPS) used with this aircraft? **a......☐ YES. b......☐ NO.** **CHECK ALL THAT APPLY**
   If YES, is the GPS: Hand-held, not IFR Approved--used for VFR only..........**c.**
   Panel-mounted, not IFR Approved--used for VFR only ....
   Panel-mounted, IFR En Route–Approved..........
   Panel-mounted, IFR Non Precision Approach–Approved..........

LIFETIME HOURS

7. What were the total lifetime airframe hours as of December 31, 1998?
8. Was the aircraft flown in Calendar Year 1998? **a. .....☐ YES. b......☐ NO.**
   If NO, survey is complete. Please return the form to the address shown above in the enclosed postage-paid envelope.

HOURS FLOWN

9. How many hours did this aircraft fly in Calendar Year 1998? (Include estimated rental and leased hours) ....
10. What percent of the hours entered in Question 9 did this aircraft fly in each of the following categories? **PERCENT OF HOURS FLOWN**

PUBLIC USE- Federal, state or local government owned or leased aircraft used in fulfilling a governmental function..........
CORPORATE/EXECUTIVE TRANSPORTATION- Company flying **with** a paid, professional crew ....
BUSINESS TRANSPORTATION - Individual use for business transportation **without** a paid, professional crew..........
PERSONAL/RECREATIONAL- Flying for personal reasons (excludes business transportation) ....
INSTRUCTIONAL - Flying under the supervision of a flight instructor (excludes proficiency flight)..........
AERIAL APPLICATION IN AGRICULTURE AND FORESTRY--For crop and timber production and protection..........
OTHER AERIAL APPLICATION - Health, cloud seeding, firefighting including forests fires, insect control, etc. ....
AERIAL OBSERVATION - Aerial mapping/photography, patrol, search and rescue, hunting, highway traffic advisory, ranching, surveillance, oil and mineral exploration, criminal pursuit, fish spotting, etc. ....
EXTERNAL LOAD - Operation under FAR Part 133, rotorcraft external load operations, examples include: helicopter hoist, hauling logs, etc. ....
OTHER WORK USE- Construction work (not FAR Part 135 operation), parachuting, aerial advertising, towing gliders, etc.....
SIGHTSEEING- Commercial sightseeing conducted under FAR Part 91..........
AIR TOURS - Commercial sightseeing conducted under FAR Part 135 ....
REGIONAL/COMMUTER–FAR Part 135 **scheduled** passenger service only ....
AIR TAXI- FAR Part 135 **on-demand** passenger and all cargo operations (not scheduled passenger service or air tours)..........
What was the average revenue in dollars per hour for this aircraft in air taxi (on-demand) operations?....... $
OTHER - Experimentation, R&D, testing, Government demonstration, air show, air racing, proficiency flight, etc. ....

TOTAL PERCENT OF HOURS FLOWN (a+b+c+d+e+f+g+h+i+j+k+l+m+n+p)= **100%**

FAA Form 1800-54 (1-99)

PLEASE CONTINUE SURVEY ON BACK PAGE

Figure A.1 SURVEY QUESTIONNAIRE (Back Side)

Form Approved OMB No. 2120-0060

11. Was the aircraft rented or leased to others in 1998? **a.**.....☐ **YES** **b.**.....☐ **NO**
If "**YES**," for how many rental or leased hours?..... **c.**

RENTAL HOURS

NOTE: The total number of hours flown in Question 12a and Question 13a, b, and c should equal the total number of hours flown in Question 9.

12. In 1998, how many hours were flown under:

		HOURS FLOWN
IFR Flight Plans	**a.**	
What percent of the IFR hours were flown under:		PERCENT IFR HOURS FLOWN
Day Instrument Meteorological Conditions (IMC)	**b.**	%
Day Visual Meteorological Conditions (VMC)	**c.**	%
Night Instrument Meteorological Conditions (IMC)	**d.**	%
Night Visual Meteorological Conditions (VMC)	**e.**	%
TOTAL PERCENT OF IFR HOURS FLOWN (b+c+d+e) =		**100%**

13. In 1998, how many hours were flown under:

		HOURS FLOWN
VFR Flight Plans	**a.**	
No Flight Plans	**b.**	
Other/Unknown	**c.**	
What percent of these hours did the aircraft fly under:		PERCENT VMC HOURS FLOWN
Day Visual Meteorological Conditions (VMC)	**d.**	%
Night Visual Meteorological Conditions (VMC)	**e.**	%
TOTAL VMC PERCENT HOURS FLOWN (d+e) =		**100%**

14. How many landings (including water, and touch and go landings) did this aircraft perform in each of the following categories in 1998?

NUMBER OF LANDINGS

LOCAL FLIGHTS..... **a.**
CROSS COUNTRY FLIGHTS..... **b.**

15. What type of landing gear system does this aircraft have?

CHECK ONLY ONE

FIXED..... **a.**
RETRACTABLE..... **b.**

16. Does this aircraft have an experimental airworthiness certificate?

a. ☐ **YES** **b.**☐ **NO**

If YES, please indicate if the aircraft, as of December 31, 1998, was:

CHECK ONLY ONE

In the test period..... **a.**
Out of the test period..... **b.**

17. What single kind/grade of fuel is primarily used in this aircraft?

PLEASE CHECK ONLY ONE

Jet Fuel..... **a.**
Aviation Fuel: 80 Octane..... **b.**
Aviation Fuel: 100 Octane..... **c.**
Aviation Fuel: 100 Octane–Low Lead..... **d.**
Automotive Gasoline..... **e.**
Propane..... **f.**
None..... **g.**

COMMENTS: Suggestions and comments about this survey and questionnaire are requested and will be given careful consideration in planning future surveys.

- Agency Display of Estimated Burden of the General Aviation and Air Taxi Activity Survey-

The public reporting burden for this collection of information is estimated to average 15 minutes per response. If you wish to comment on the accuracy of the estimate or to make suggestions for reducing this burden, please direct your comments to FAA and the OMB at the following addresses:

U.S. DOT Federal Aviation Administration

Office of Management and Budget

FAA Form 1800-54 (1-99)

2.2 Geographic

The sample survey covers general aviation and air taxi aircraft registered within the United States Aircraft Registry as of December 31, 1998. Over 99 percent of these aircraft are registered to owners living in the 50 states; the District of Colombia; Puerto Rico; and other U.S. territories, which include American Samoa, Guam, and the Virgin Islands.[1]

2.3 Content

The survey questionnaire, FAA Form 1800-54 shown previously in Figure A.1, requests the aircraft owner to provide the following information on the sampled aircraft's characteristics and uses for various periods:

1) year aircraft was manufactured, hours by use, IFR hours, percentage of hours flown in Instrument Meteorological Conditions (IMC) and Visual Meteorological Conditions (VMC) during the day and evening, fuel type, and number of local and cross country landings for the entire calendar year 1998; and

2) airframe hour reading and the aircraft's base location as of December 31, 1998

3. SURVEY METHOD

The survey data were collected by mailing the questionnaire to the owners of the sampled aircraft in three mailings. The first mailing in March 1999 covered all 30,114 aircraft in the sample and had a response rate of 43.1 percent, as shown in Table A.1. This accounted for approximately 70 percent of the total responses to the survey. The second mailing in April, 1999 included only those aircraft in the sample that had not yet been received or had not yet responded and were not a Post Master Return (PMR). The second mailing had a response rate of 21.7 percent, which accounted for approximately a quarter of the total responses to the survey. The third mailing in May 1999 was sent to owners of the sampled aircraft who had not responded to the first or second mailings as of a specified date. The third mailing produced a response rate of 11.8 percent, or approximately twelve percent of the total responses to the survey. The overall survey responses resulted in a response rate of 64.3 percent.

TABLE A.1 SUMMARY OR RESPONSE INFORMATION

PHASE	VALID SAMPLE	RESPONSES	RESPONSE RATE	% TOTAL RESPONSE
1ST Mailing	30,114	12,986	43.1%	70.5%
2nd Mailing	15,535	3,993	25.7%	21.7%
3rd Mailing	11,542	1,363	11.8%	7.4%
TOTAL:	28,521[2]	18,342[3]	64.3%[4]	100.0

[1] Source: FAA Aircraft Registration Master File as of December 31, 1998.
[2] The Total Valid Sample Size used to computer the overall survey response rate excludes all Postmaster returns (PMRs).

Each of the three mailings was accompanied by a cover letter, shown respectively in Figures A.2, A.3, and A.4 at the back of this appendix.

4. SAMPLE DESIGN

4.1 Sample Frame and Size

The FAA Mike Monroney Aeronautical Center in Oklahoma City maintains the Aircraft Registration Master File, which is the official record of registered civil aircraft in the United States.

The sample frame is made up of all aircraft identified as general aviation in the master file (according to the definition in Section 2.1), with the following exception:

1) aircraft registered to dealers;

2) aircraft with "Sale Reported" or "Registration Pending" appearing in the record instead of the owner's name;

3) aircraft with a known, inaccurate owner's address;

4) aircraft with missing state of registration, aircraft make-model-series code, or aircraft type information; and

For calendar year 1998, the sample frame consisted of 255,309 general aviation aircraft records from which 30,114 records were sampled, yielding an 11.8 percent sample. Table A.2 shows, by aircraft type, the distribution of the sample compared to that of the population. This clearly demonstrates the disproportionality of the sample to the population, an intended result of the sample design to gain efficiency and to control errors.

4.2 Description of Sample Design

The sample design employed was a stratified, systematic design from a random start. The sample was selected from a two-way stratified frame matrix. The two stratification criteria were:

1) state or territory of aircraft registration, and

2) aircraft type

The 54 levels of the state criterion and the 19 levels of aircraft type yielded a matrix of 54 by 19 or 1,026 cells (strata) among which the frame was divided for sampling.

The FAA's primary requirement is for estimates of average annual flight hours per aircraft, necessitating optimal determination of sample sizes based on flight hour variation by state and by aircraft type, and not on population. Hence, the sample was not proportional to size, and a sampling fraction was determined for each cell with a non-zero population. Sample units were randomly selected within individual cells, yielding a final sample size of 30,114 aircraft.

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[3] The total responses include air carrier and commuter aircraft.

TABLE A.2 SAMPLE AND POPULATION DISTRIBUTION BY AIRCRAFT TYPE

TYPE	APPROXIMATE POPULATION	SAMPLE SIZE	SAMPLE AS % OF POPULATION
Fixed Wing – Piston			
1 Engine: 1-3 Seats	59,408	6,149	10.4%
1 Engine: 4+ Seats	114,030	7,791	6.8%
2 Engine: 1-6 Seats	15,233	1,504	9.9%
2 Engine: 7+ Seats	6,800	1,569	23.1%
Piston: Other	214	58	27.1%
Fixed Wing-Turboprop			
1 Engine: Total	1,071	241	22.5%
2 Engine: 1-12 Seats	4,231	397	9.4%
2 Engine: 13+ Seats	1,041	1,036	99.5%
Turboprop: Other	97	32	33.0%
Fixed Wing – Turbojet			
2 Engine	6,275	981	15.6%
Turbojet: Other	689	359	52.1%
Rotorcraft			
Piston	3,560	2,532	71.1%
1 Engine: Turbine	4,419	866	19.6%
Multi-Engine: Turbine	1,076	184	17.1%
Other Aircraft			
Gliders	2,723	541	19.9%
Lighter-than-Air	5,718	961	16.8%
Experimental			
Amateur	24,151	4,283	17.7%
Exhibition	2,431	215	8.8%
Other	2,141	315	14.7%
TOTAL:	**255,309**[5]	**30,114**	**11.8%**

Initially, each aircraft in the sample was given a weight which was the inverse of its cell's sampling fraction, and which corresponded to the number of aircraft in the sample frame represented by that aircraft. When all responses to the survey were tallied, each weight was adjusted according to the response rate for the cell, counting an aircraft for which no survey questions were answered as a non-respondent, and an aircraft for which at least one question was answered as a respondent.

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[4] The formula used to compute the overall response rate was Total Number of Responses divided by the Sample Size minus the PMRs (1,593).

[5] In previous years the General Aviation population was adjusted downward for GAATA surveys that were returned where owners identified the aircraft as an air carrier. In 1998, the population was also adjusted downward to account for the percentage of survey non-respondents who are air carriers. The percentage of survey respondents who identified themselves as air carriers in the 1998 GAATA survey was used as the estimate of the percent of GAATA survey nonrespondents who are air carriers.

The weight adjustment is described as follows:

1) non-respondents' and post return weights were changed to zero; and

2) the weights of all responding aircraft were adjusted uniformly by dividing the initial weight by the response rate for the cell.

This method of weight adjustment has several attributes. It actually incorporates the response rates into the final weights and simplified estimation procedures.

4.3 Error

Errors associated with estimates derived from sample survey results fall into two categories: sampling and non-sampling errors. Sampling errors occur because the estimates are based on a sample rather than the entire population.

Non-sampling errors arise from a number of sources such as non-response, inability or unwillingness of respondents to provide correct information, differences in interpretation of questions, mistakes in recording or coding the data obtained, and others. The following sections discuss the two types of errors.

4.4 Sampling Error

In a designed survey, the sampling error associated with an estimate is generally unknown, but a measurable quantity, known as the standard error, is often used as a guide to the potential magnitude of sampling error. The standard error measures the variation which would occur among the estimates from all possible samples of the same design from the same population. It measures the precision with which an estimate approximates the average result of all possible samples or the result of a survey in which all elements of the population were sampled.

Through sample design techniques, the statistician can control the sizes of standard errors on a few key variables, known as design variables, in the survey. The design variables in the GAATA Survey are the average annual hours flown per aircraft by aircraft type, by aircraft manufacturer/model characteristics and by state of aircraft registration. The sample is designed to produce standard errors on these variables at levels specified by the FAA. No controls are placed on the standard errors of the non-design variables.

An estimate and its standard error make it possible to construct an interval estimate with the prescribed confidence that the interval will include the average value of the estimate from all possible samples of the population. Table A.3, on the following page, shows selected interval widths and their corresponding confidence.

TABLE A.3 CONFIDENCE OF INTERVAL ESTIMATES

WIDTH OF INTERVAL	APPROXIMATE CONFIDENCE THAT INTERVAL INCLUDES AVERAGE VALUE
1 Standard error	68%
2 Standard error	95%
3 Standard error	99%

Every estimate resulting from a sample survey, whether it be for a design or non-design variable, has sampling error associated with it. The user of survey results must consider sampling error along with the point estimate itself when making inferences or drawing conclusions about the sample population. A large standard error relative to an estimate indicates lack of precision and, inversely, a small standard error indicates precision. To facilitate the comparison of estimates and their errors, the tables in this publication display standard errors for all estimated quantities. For the most part, the measure of precision presented in this report is the relative standard error, which is merely the ratio of the standard error to the estimate times 100 (to convert the fraction to a percent). In addition to immediately communicating the relative precision of the estimate, it allows ready comparison of the survey'' performance across variables. The following is an example of how to use the relative standard error: from Table 2.1, a 95 percent confidence interval for the number of active rotorcraft with piston engines would be 2,545 plus or minus 2(9.0/100)(2,545) or the interval between 2,087 and 3,003. One would say that with 95 percent confidence that the number of active rotorcraft with piston engines lies somewhere between 2,087 and 3,003. Another way of expressing this is that we are highly confident (95 percent) that the number of active rotorcraft with piston engines is within plus or minus 2(9.0) percent or 18.0 percent of 2,545.

4.5 Non-Sampling Error

Sampling error can be reduced through survey design, however, the amount of non-sampling error is difficult, if not impossible, to quantify in any given design. There are, however, various techniques which can limit non-sampling error.

Several of these techniques were incorporated into the design of the GAATA Survey and are itemized below:

1) A second and third mailing, including a prompting (reminder) letter, were sent to nonrespondents in addition to the original mailing in order to improve the response rate, since a low response rate is a major cause of non-sampling error.

2) To assure the owners of the confidentiality of their responses, the back side of the questionnaire cover letter informed that:

   "The information you have provided in the past has never been published or released in

any form that would reveal specific information reported by any individually identifiable respondent."[6]

3) Comprehensive editing procedures insured the accuracy of the data transcription to machine readable form and the internal consistency of responses.

4) The official and most accurate source of information available on the general aviation and air taxi fleet, the FAA Aircraft Registration Master File, was used as the sampling frame.

5) Results were adjusted using data from a telephone survey of nonrespondents conducted in 1998. This adjustment is described in Section 5.1, Adjustments based on the 1998 Telephone Survey of Nonrespondents, on page A-12.

5. RESPONSE RATE

The response rate for 1998 was 64.3%. Possible causes for the less than 100% sample rate response include:

- The deterioration of the currency of aircraft owners' addresses in the Aircraft Registration Master File, the samples frame. This has caused a gradual increase in the percentage of PMRs. For the 1998 Survey, 5.3% of questionnaires were returned undelivered by the postmaster.

- Repeated sampling of aircraft in two and possibly three or four successive years. Due to the design of the sample to achieve specified precision in estimates for states and aircraft type, it is impossible to avoid sampling some of the same aircraft in consecutive years. Owners of such aircraft may have been less willing to respond. Increasing the minimum cell size may have somehow mitigated the problem in 1998.

Table A.4, on the following page, reveals the responses by aircraft type.

5.1 Adjustments Based on a Telephone Survey of Nonrespondents

From the conduct of the first General Aviation Activity (GAAA) Survey in 1977 through the 1990 Survey year, the survey data were not adjusted to account for nonrespondents (aircraft owners selected as part of the survey sample but who chose not to complete and return the form). This is because telephone surveys of nonrespondents conducted in 1977, 1978 and 1979 did not show any significant differences or inconsistencies between respondents' and nonrespondents' replies. In 1980, the telephone survey was discontinued as a cost-saving measure.

The GAATA Survey response rate has fallen from over 70 percent prior to 1980 to the 60-70 percent range in most years since 1983, and the number of postmaster returns has greatly increased. Therefore, the FAA decided to conduct a telephone survey of nonrespondents to the 1990 GAA Mail Survey. This telephone survey found that there was a significant difference in the ratio of active aircraft and inactive aircraft between mail respondents and telephone respondents.

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[6] See Figure A.2.

Nonresponse adjustment factors derived from these survey results have been applied to the GAA Survey up through 1995. In 1997, a telephone survey of nonrespondents to the 1996 GAATA Mail survey was conducted. In 1998, a telephone survey of nonrespondents to the 1997 GAATA Mail survey was conducted. Again, this survey showed significant differences between respondents and nonrespondents to the mail survey. This information has been used to correct 1998 estimates for nonresponse bias. The results of this telephone survey have also been integrated into the 1991 through 1997 surveys to estimate more accurately active aircraft and hours flown.

TABLE A.4 RESPONSE RATE BY AIRCRAFT TYPE

TYPE	SAMPLE	PMR's	RESPONSES	RESPONSE RATE
Fixed Wing – Piston				
1 Engine: 1-3 Seats	6,149	280	3,889	66.3%
1 Engine: 4+ Seats	7,791	294	5,210	69.5%
2 Engine: 1-6 Seats	1,504	102	847	60.4%
2 Engine: 7+ Seats	1,569	94	814	55.2%
Piston: Other	58	5	25	47.2%
Fixed Wing-Turboprop				
1 Engine: Total	241	7	113	48.3%
2 Engine: 1-12 Seats	397	18	213	56.2%
2 Engine: 13+ Seats	1,036	47	604	62.1%
Turboprop: Other	32	2	18	60.0%
Fixed Wing – Turbojet				
2 Engine	981	62	449	48.9%
Turbojet: Other	359	18	185	54.3%
Rotorcraft				
Piston	2,532	181	1,274	54.2%
1 Engine: Turbine	866	42	483	58.6%
Multi-Engine: Turbine	184	2	113	62.1%
Other Aircraft				
Gliders	541	20	349	67.0%
Lighter-than-Air	961	88	521	59.7%
Experimental				
Amateur	4,283	302	2,903	72.9%
Exhibition	215	0	129	60.0%
Other	315	16	203	67.9%
TOTAL:	**30,114**	**1,593**	**18,342**	**64.3%**[7]

[7] The 64.3 response rate is computed by subtracting the PMR's from the total valid sample size of 30,114.

5.2 The Non-respondent Survey

The substantial nonresponse rate for the GAATA Survey and developments in the sampling frame outlined above have led to a concern that there may be a response bias in the survey, especially with respect to the percent and number of aircraft that are active. The hypothesis is that aircraft of owners that do not respond to the survey are less likely to have been active than aircraft of owners that do. If this hypothesis is correct, the results of the survey overstate the percent and number of active aircraft.

In order to test this hypothesis, and to provide data for adjusting the survey findings, a telephone survey of nonrespondents to the 1998 survey was conducted. The survey focused on two substantive questions:

> Was this aircraft flown during calendar year 1998?

If so:

> How many hours did this aircraft fly in calendar year 1998?

The survey of nonrespondents also included screening questions to determine whether the respondent still owned the aircraft, and whether the aircraft was flown as an air carrier or commuter.

The survey of nonrespondents was conducted by telephone. The sample for the survey was selected at random from the nonrespondents in the 1998 GAATA Survey sample. The sampling objective was to obtain a sample large enough to achieve 95 percent confidence that the telephone survey estimate of the proportion of nonrespondents with active aircraft would be within 5 percent of the true proportion.

5.3 Adjustments of the 1998 GAATA Survey Data

Because of variability between 1996 and 1998 Telephone Non-response Survey data, a combination of the 1996 and 1998 Telephone Nonresponse Survey data were used to adjust the 1998 GAATA Survey results.[8] Adjustments were made for the percent and number of active aircraft and for average hours flown. Total hours flown were adjusted indirectly, since they are derived from the number of active aircraft and average hours flown. In essence, the adjustment was made by replacing the GAATA Survey results for percent active and average hours with weighted averages of the results of the 1998 GAATA Survey and a combination of the 1996 and 1998 Telephone Nonresponse Survey. The exact procedure is described below. The adjustments were made for each aircraft type, but they carry over to results for aircraft groups, regions and states. Adjustments were made in all tables in Chapters 1, 2, 3, 4, 5, 6, and 7 in which the 1998 number or percent of aircraft active, average hours flown, or total hours flown appear.

[8] To control for instabilities in the Telephone Non-response Survey data, the bias estimates were bounded at a minimum of .8 and a maximum of 1.2. In addition, for aircraft types with less than ten telephone interviews, the bias was set to 1.

Weighted averages of the percent of active aircraft and average hours flown were computed as part of the adjustment procedure. The values of percent of active aircraft and average hours flown were taken from the 1998 GAATA Survey results and the combination of the 1996 and 1998 Telephone Nonresponse Survey results. The weights used were the initial weights for the aircraft that responded to the 1998 GAATA Survey and for 1998 GAATA Survey nonrespondents. Weights of the GAATA Survey forms that were returned by the postmaster were not used in the calculations. This "non-treatment" of postmaster returns (PMRs) in the sample has the effect of assuming that PMRs are similar to the average adjusted results. Separate weighted averages were calculated for each of the nineteen aircraft types in the 1998 GAATA Survey. The weighted averages for percent of active aircraft were calculated as follows:

$$\frac{\{(PercentActive)_{Ri}\, x(TotalWeight)_{Ri}\} + \{(PercentActive)_{TRi}\, x(TotalWeight)_{NRi}\}}{(TotalWeight)_{Ri} + (TotalWeight)_{NRi}}$$

Where: R=1997 GAATA Respondents
TR=1998 Telephone Survey Respondents
NR=1998 GAATA Nonrespondents
i= Aircraft Type (i=1 to 19)

The weighted averages for average hours flown were calculated as follows:

$$\frac{\{(AverageHours)_{Ri}\, x(TotalWeight)_{Ri}\} + \{(AverageHours)_{TRi}\, x(TotalWeight)_{NRi}\}}{(TotalWeight)_{Ri} + (TotalWeight)_{NRi}}$$

Where: R=1998 GAATA Respondents
TR=1998 Telephone Survey Respondents
NR=1998 GAATA Nonrespondents
i= Aircraft Type (i=1 to 19)

The actual adjustment to the 1998 GAATA results was made by modifying the final weight of each aircraft that responded to the 1998 GAATA Survey. First, the weighted averages were converted into adjustment factors for each aircraft type, and then the weight of each responding aircraft was multiplied by the adjustment factor for the aircraft type of that aircraft. The adjustment factors were computed by dividing the weighted averages of the percent active and average hours flown by the unadjusted 1998 GAATA Survey results for these values, i.e.:

$$\frac{(PercentActive)_{WAi}}{(PercentActive)_{Ri}} \text{ and } \frac{(AverageHours)_{WAi}}{(AverageHours)_{Ri}}$$

Where: WA=Weighted Average (calculated above)
R=1998 GAATA Survey Respondents
i= Aircraft Type (i=1 to 19)

Weights of all aircraft in an aircraft type were adjusted by the same proportional amount. This procedure provided a limited amount of disaggregation of the adjustment. Among other implications of this procedure, all aircraft groups within each aircraft type were also adjusted by the same proportional amount. Adjusting the weights of each individual respondent aircraft allowed results for regions and States to be adjusted, even though the adjustment factors were computed at the aircraft type level. Adjustment at the individual record level also produced adjustments in the standard errors.

In 1998, the adjustment lowered the estimate of total number of active aircraft by 903 aircraft or .4 percent. The number of active aircraft in seven individual aircraft types decreased; two individual aircraft types remained unchanged, and ten individual aircraft types had increased active aircraft populations. The adjustment increased the overall estimate of average hours flown by 2.3 hours or 1.7 percent. Average hours flown was adjusted downward for ten individual aircraft types; two individual aircraft types remained unchanged, while seven individual aircraft types' Average Hours increased. The largest incremental increase in average hours (18 percent) was Fixed-wing Piston 2 Engine, 1-6 seats aircraft. Hours flown were decreased by 412,249 hours or 1.5 percent, with eight individual aircraft types adjusted downward; eight individual aircraft types adjusted upward; and three aircraft types remained unchanged.

FIGURE A.2 FIRST COVER LETTER PAGE 1

U.S. Department
of Transportation
Federal Aviation
Administration

800 Independence Ave., SW
Washington, DC 20591

February, 1999

Dear Aircraft Owner:

This is the 21st consecutive year that the Federal Aviation Administration (FAA) has conducted the annual General Aviation/Air Taxi Activity Survey to gather valuable information on the general aviation and air taxi fleet activities. The information collected in the survey is used both by the FAA and the aviation industry to help pinpoint potential safety problems, forecast FAA future work force needs and new requirements for air traffic facilities, and to form the bases for critical research and analysis of general aviation issues.

The FAA works closely with general aviation industry groups to make this survey clear, concise, and of maximum usefulness to all interested parties. (Please see the enclosed letter from the various industry associations expressing the importance of the information provided by the survey.)

You are one of about 30,000 aircraft owners selected to participate in the 1998 survey. If you have been selected in previous years, it is because the number of aircraft like yours is small. We, therefore, greatly need your response to further validate our results. Enclosed is a questionnaire requesting information for calendar year 1998. Please read the instructions on the back of this letter, and answer all questions for the aircraft identified on the form.

I urge you to complete the questionnaire and use the enclosed postage paid envelope to mail it in today. Your prompt response will preclude you from receiving follow-up letters and questionnaires during the year. All replies to this questionnaire are held by the FAA in the strictest confidence.

If you have any questions or need further assistance, or if there is any way we can make it easier for you to participate in the survey, please call the following toll-free number: 1-800-373-9040 and one of my staff will answer your questions. If your call is not returned within 24 hours, please contact me at 202-267-3355. You can also e-mail questions or comments to 9-APO-GASURVEY@ faa.gov.

The FAA and the general aviation industry thank you for your participation.

Sincerely,

Robert L. Bowles
Manager, Statistics and Forecast Branch

Enclosures

FIGURE A.2 FIRST COVER LETTER PAGE 2

The 1998 General Aviation and Air Taxi Activity Survey

Why does the FAA collect this information?

For the past 21 years, the FAA has conducted this annual sample survey to collect information on the uses of the general aviation fleet. The information that is collected helps the FAA understand more about general aviation activities, assess the impact of general aviation activities on the National Airspace System, and determine the need for increased traffic facilities and services. These data are used by the Federal, state, and local governments, as well as by private industry and individuals, for safety analyses, planning, forecasting, and research & development. We have made a concerted effort to minimize the number of questions we ask while still meeting the needs of government and the public for aviation information.

How does the FAA handle the survey information?

The information aircraft owners have provided for this survey in the past has never been published or released in any form that would reveal specific information reported by an identifiable respondent.

Why was I selected for this survey?

This survey covers general aviation aircraft and air taxis. The survey sample is randomly selected, based upon the FAA Aircraft Registry as of December 31, 1998. The Registry shows you as a registrant of this aircraft on that date. Your aircraft is one of approximately 30,000 general aviation aircraft selected to be surveyed this year. If you have been selected in previous years, it is because the number of aircraft like yours is small. We, therefore, greatly need your response to further validate our results. When more than one of your aircraft is selected, you will receive, under separate cover, a questionnaire for each aircraft. Please answer all questions for the identified aircraft only. If you cannot provide a precise answer to any questions, make your best estimate.

What should I do if...

- ***If...*** you are no longer in possession of this aircraft but were the registered owner on December 31, 1998, try to answer all the questions. If your aircraft was sold prior to December 31, 1998 ***please forward this mail to the new owner for response.***
- ***If...*** your aircraft was operated by an airline (FAR Part 121), ***indicate this in question 2 and return the questionnaire to the FAA.***
- ***If...*** your aircraft, for whatever reason, was not in use during calendar year 1998, answer questions 4, 5, 6, 7 and 17 and return the questionnaire to the FAA. ***The fact that your aircraft was not flown during the year is just as important as the fact that it was flown.***
- ***If...*** your aircraft was operated primarily by another person or company (e.g., leased), ***please obtain the necessary information from the operator, or forward this mail to the person or firm for response***.
- ***If...*** your aircraft was stolen, destroyed, lost, donated to an organization, or otherwise not in your possession, ***and you have not yet notified the FAA Aircraft Registry in writing, please do so immediately at the following address:***

Aircraft Registration Branch, AFS-750
P. O. Box 25504
Oklahoma City, OK 73125

The signature of the aircraft owner of record is required to make any changes to the aircraft registration record. If you have any questions regarding the registration of your aircraft, please call (405) 954-3116.

- ***If...*** you wish to fax the survey information to us, our FAX No. is: (202) 267-9636
- ***If...*** you have a question about the survey, call us on our toll free number: 1-800-373-9040. You can also e-mail us at 9-APO-GASURVEY@faa.gov.

FIGURE A.3 SECOND COVER LETTER PAGE 1

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., SW
Washington, DC 20591

April, 1999

Dear Aircraft Owner:

We need your input!

In February, we sent you a General Aviation/Air Taxi Activity Survey questionnaire to compile 1998 aircraft activity information. We have not received your response.

In case our first mailing never reached you or was misplaced, we have enclosed another identical questionnaire with a return postage-paid envelope for your convenience. Please read the instructions on the back page of this letter, complete the questionnaire, and use the enclosed envelope to return it to us today.

If you have any questions or need further assistance, or if there is any way we can make it easier for you to participate in the survey, please call the following toll-free number:

1-800-373-9040 and one of my staff will answer your questions. If your call is not

returned within 24 hours, please contact me at 202-267-3355. You can also e-mail questions or comments to 9-APO-GASURVEY@ faa.gov. If your response is already in the mail, we thank you for your cooperation.

We look forward to receiving your response so that the FAA and the general aviation industry can know more about general aviation flying and serve you better. Thank you for your participation.

Sincerely,

Robert L. Bowles
Manager, Statistics and Forecast Branch

Enclosures

FIGURE A.3 SECOND COVER LETTER PAGE 2

The 1998 General Aviation and Air Taxi Activity Survey

Why does the FAA collect this information?

For the past 21 years, the FAA has conducted this annual sample survey to collect information on the uses of the general aviation fleet. The information that is collected helps the FAA understand more about general aviation activities, assess the impact of general aviation activities on the National Airspace System, and determine the need for increased traffic facilities and services. These data are used by the Federal, state, and local governments, as well as by private industry and individuals, for safety analyses, planning, forecasting, and research & development. We have made a concerted effort to minimize the number of questions we ask while still meeting the needs of government and the public for aviation information.

How does the FAA handle the survey information?

The information aircraft owners have provided for this survey in the past has never been published or released in any form that would reveal specific information reported by an identifiable respondent.

Why was I selected for this survey?

This survey covers general aviation aircraft and air taxis. The survey sample is randomly selected, based upon the FAA Aircraft Registry as of December 31, 1998. The Registry shows you as a registrant of this aircraft on that date. Your aircraft is one of approximately 30,000 general aviation aircraft selected to be surveyed this year. If you have been selected in previous years, it is because the number of aircraft like yours is small. We, therefore, greatly need your response to further validate our results. When more than one of your aircraft is selected, you will receive, under separate cover, a questionnaire for each aircraft. Please answer all questions for the identified aircraft only. If you cannot provide a precise answer to any questions, make your best estimate.

What should I do if...

- ***If...*** you are no longer in possession of this aircraft but were the registered owner on December 31, 1998, try to answer all the questions. If your aircraft was sold prior to December 31, 1998 ***please forward this mail to the new owner for response.***
- ***If...*** your aircraft was operated by an airline (FAR Part 121), ***indicate this in question 2 and return the questionnaire to the FAA.***
- ***If...*** your aircraft, for whatever reason, was not in use during calendar year 1997, answer questions 4, 5, 6, 7 and 17 and return the questionnaire to the FAA. ***The fact that your aircraft was not flown during the year is just as important as the fact that it was flown.***
- ***If...*** your aircraft was operated primarily by another person or company (e.g., leased), ***please obtain the necessary information from the operator, or forward this mail to the person or firm for response***.
- ***If...*** your aircraft was stolen, destroyed, lost, donated to an organization, or otherwise not in your possession, ***and you have not yet notified the FAA Aircraft Registry in writing, please do so immediately at the following address:***

Aircraft Registration Branch, AFS-750
P. O. Box 25504
Oklahoma City, OK 73125

The signature of the aircraft owner of record is required to make any changes to the aircraft registration record. If you have any questions regarding the registration of your aircraft, please call (405) 954-3116.

- ***If...*** you wish to fax the survey information to us, our FAX No. is: (202) 267-9636
- ***If...*** you have a question about the survey, call us on our toll free number: 1-800-373-9040. You can also e-mail us at 9-APO-GASURVEY@faa.gov.

FIGURE A.4 THIRD COVER LETTER PAGE 1

U.S Department
of Transportation
Federal Aviation
Administration

800 Independence Ave., SW
Washington, DC 20591

May, 1999

Dear Aircraft Owner:

The Federal Aviation Administration needs your help. Please participate in the 1998 General Aviation/Air Taxi Activity and Avionics Survey.

In February and April, we sent you a General Aviation/Air Taxi Activity Survey questionnaire to compile the 1998 aircraft activity information. We have not received your response.

In case the previous mailings never reached you or were misplaced, we have enclosed another identical questionnaire with a return postage-paid envelope for your convenience. Please read the instructions on the back page of this letter, complete the questionnaire, and use the enclosed envelope to return it to us today.

If you have any questions or need further assistance, please call the following toll-free number: 1-800-373-9040 and one of my staff will answer your questions. If your call is not returned within 24 hours, please contact me at 202-267-3355. You can also e-mail questions or comments to 9-APO-GASURVEY@ faa.gov.

We look forward to receiving your response no later than June 15, so that we can include your input in the 1998 statistics.

If your response is already in the mail, thank you for your cooperation.

Sincerely,

Robert L. Bowles
Manager, Statistics and Forecast Branch

Enclosures

FIGURE A.4 THIRD COVER LETTER PAGE 2

The 1998 General Aviation and Air Taxi Activity Survey

Why does the FAA collect this information?

For the past 21 years, the FAA has conducted this annual sample survey to collect information on the uses of the general aviation fleet. The information that is collected helps the FAA understand more about general aviation activities, assess the impact of general aviation activities on the National Airspace System, and determine the need for increased traffic facilities and services. These data are used by the Federal, state, and local governments, as well as by private industry and individuals, for safety analyses, planning, forecasting, and research & development. We have made a concerted effort to minimize the number of questions we ask while still meeting the needs of government and the public for aviation information.

How does the FAA handle the survey information?

The information aircraft owners have provided for this survey in the past has never been published or released in any form that would reveal specific information reported by an identifiable respondent.

Why was I selected for this survey?

This survey covers general aviation aircraft and air taxis. The survey sample is randomly selected, based upon the FAA Aircraft Registry as of December 31, 1998. The Registry shows you as a registrant of this aircraft on that date. Your aircraft is one of approximately 30,000 general aviation aircraft selected to be surveyed this year. If you have been selected in previous years, it is because the number of aircraft like yours is small. We, therefore, greatly need your response to further validate our results. When more than one of your aircraft is selected, you will receive, under separate cover, a questionnaire for each aircraft. Please answer all questions for the identified aircraft only. If you cannot provide a precise answer to any questions, make your best estimate.

What should I do if...

- ***If...*** you are no longer in possession of this aircraft but were the registered owner on December 31, 1998, try to answer all the questions. If your aircraft was sold prior to December 31, 1998 ***please forward this mail to the new owner for response.***
- ***If...*** your aircraft was operated by an airline (FAR Part 121), ***indicate this in question 2 and return the questionnaire to the FAA.***
- ***If...*** your aircraft, for whatever reason, was not in use during calendar year 1997, answer questions 4, 5, 6, 7 and 17 and return the questionnaire to the FAA. ***The fact that your aircraft was not flown during the year is just as important as the fact that it was flown.***
- ***If...*** your aircraft was operated primarily by another person or company (e.g., leased), ***please obtain the necessary information from the operator, or forward this mail to the person or firm for response***.
- ***If...*** your aircraft was stolen, destroyed, lost, donated to an organization, or otherwise not in your possession, ***and you have not yet notified the FAA Aircraft Registry in writing, please do so immediately at the following address:***

Aircraft Registration Branch, AFS-750
P. O. Box 25504
Oklahoma City, OK 73125

The signature of the aircraft owner of record is required to make any changes to the aircraft registration record. If you have any questions regarding the registration of your aircraft, please call (405) 954-3116.

- ***If...*** you wish to fax the survey information to us, our FAX No. is: (202) 267-9636
- ***If...*** you have a question about the survey, call us on our toll free number: 1-800-373-9040. You can also e-mail us at 9-APO-GASURVEY@faa.gov.